Space Weather Forecast

Issued on Sunday, 15 May 2022 at 01:22 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts becoming more likely from X-ray flares. Slight chance of Minor geomagnetic storm, peaking 16 May.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with frequent low-level common-class flares that increased in amplitude late in the UTC day.

There were up to seven sunspot regions visible on the sun in the period, as although one faded from view in the north centre-disc, several new regions emerged. Of particular note is the northeastern solar horizon, with this portion of the sun is showing bright flux looping in extreme UV light, and may yet reveal further groups in the coming 24 hours or so.

The front side remains dominated areally by a large and complex sunspot near the solar meridian in the southern hemisphere, with a slight spreading trend evident and minor proliferation in its intermediate portions. To its southwest, a visually much-weakened remnant of an active sunspot group showed fading across the board.

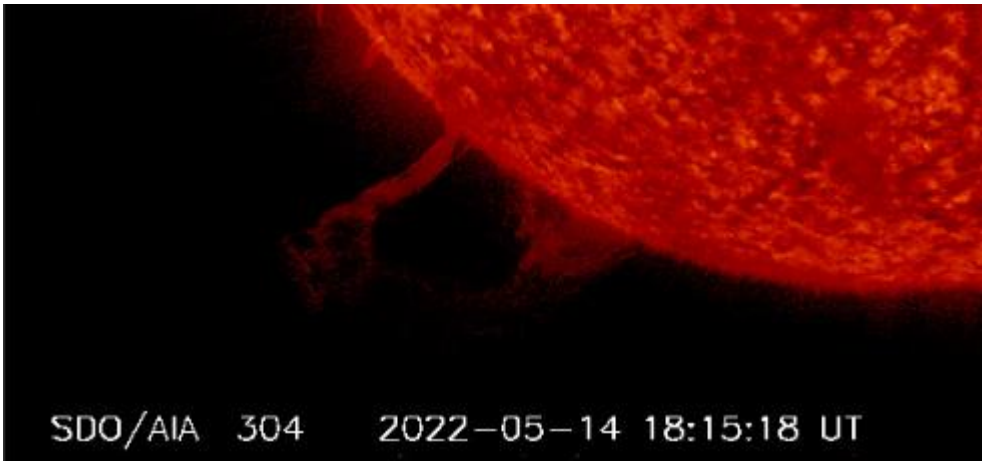

Figure 1: Large low-latitude 'prominence erupton', seen heading southeast on evening satellite imagery to no likely effect at Earth.

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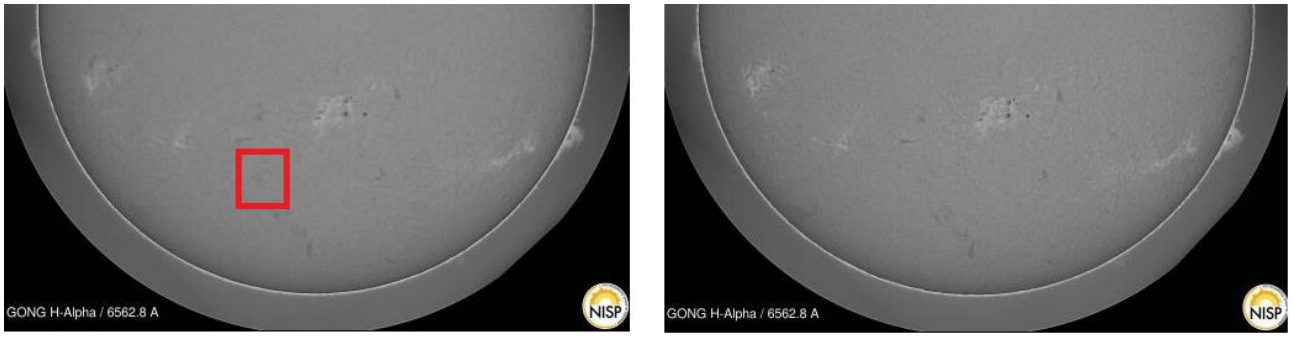

Figure 2: Near infra red ground-based telescope view of dark 'filaments' (arcs of plasma) on the sun. These can be sources of CMEs should they be ejected with force from the immediate solar environment. It is not yet clear from satellite imagery whether this event has produced any interplanetary CME, but this is being monitored.

There remain numerous small 'filaments' (arcs of plasma) on the sun. A large 'prominence' (arc of plasma on the edge of the sun) eruption occurred from the southeast around 14/1800UTC, with this event visible in satellite imagery but directed below the plane of the Earth's orbit to no effect at Earth. Another feature was seen to disappear gradually from the south-centre part of the sun at 14/2000UTC on ground-based near infra red imagery. This event is being watched for, but for the moment no Earth directed Coronal Mass Ejections (CMEs) have been observed in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind showed a slightly enhanced behaviour through the course of the day. The source of this is uncertain, but perhaps best resembles a minor fast wind high speed stream. This has perhaps arisen from a small calved portion an expected coronal hole visible in extreme UV satellite imagery in the northwest of the sun, although this is not conclusive.

The solar wind speed showed a rising trend to reach slightly elevated levels by the end of the UTC day, with the number of particles comprising the wind showing similar enhancement for a time before falling during the UTC evening as the possible high speed stream began in earnest. The magnetic field associated with these particles gradually rose over the course of the day, but with a fortunately mainly co-aligned (with Earth's field) north-south component to limit geomagnetic effects.

As suggested, the net effect of these solar wind measures was nevertheless quiet through the 24-hour period.,

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity should be low to moderate, with moderate-class flares becoming more likely, and a slight chance of a strong-class flare. The flare risk may trend a little higher through the period owing to an active northeastern solar horizon.

Solar Wind / Geomagnetic Activity: No CMEs feature in the forecast.

The current solar wind enhancement may be a minor precursor coronal hole to the expected fast wind from a larger, more established feature, bringing forward a slight chance of Minor Geomagnetic Storm G1. This is the only expected enhancement in the four-day period, and a gradual reversion to quiet conditions is expected by midweek UTC.

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Energetic Particles / Solar Radiation: Solar radiation storms are unlikely in the period, although there is slight risk of an S1 or greater event, mainly due to the westward advance of some of the larger and more complex sunspots on the facing side.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	20	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	60	60	60
Very Active	R3 to R5 X	No	5	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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